Trend Study 16C-35-04

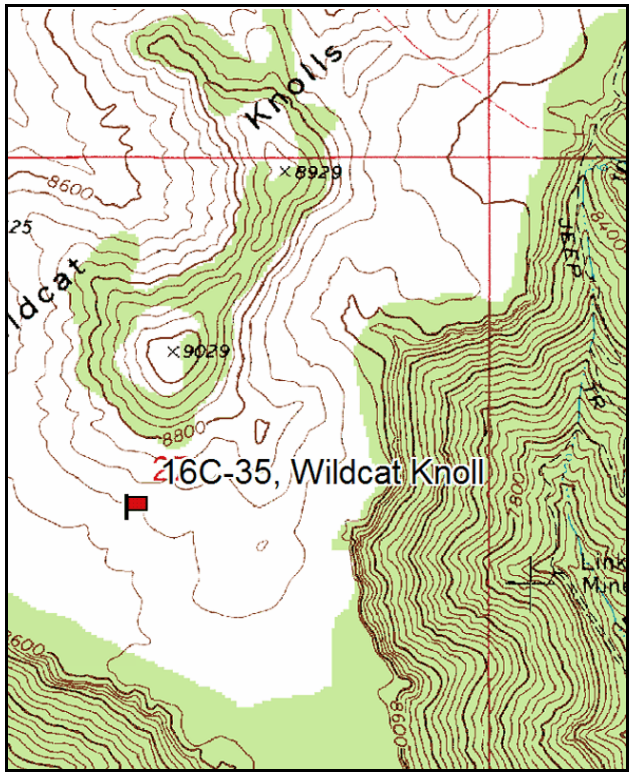
Study site name: Wildcat Knoll . Vegetation type: Mountain Big Sagebrush .

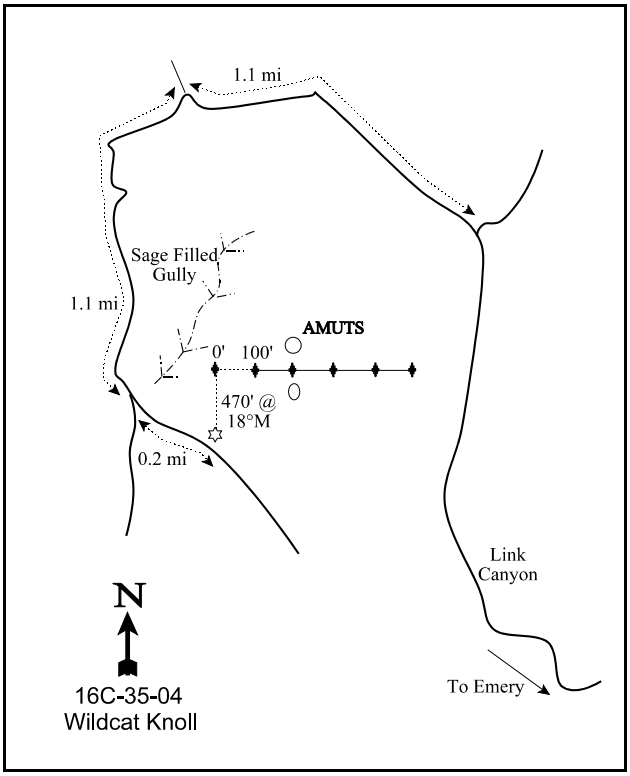
Compass bearing: frequency baseline 95 degrees magnetic.

Frequency belt placement: line 1 (11 ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), and line 5 (95 ft).

LOCATION DESCRIPTION

From Center St. in Emery, travel west 1.2 miles. Turn right onto a dirt road and proceed for 0.6 miles. Turn left and travel 8.7 miles (1.7 miles from turnoff to site 16C-31). Bear left at the fork and travel 1.1 miles to another fork. Stay left on F.S. #344 for 1.1 miles to another fork (at 0.1 miles on F.S. #344, go left at the fork). At the fork, bear left and travel 0.2 miles to a witness post. From the witness post to the 0 ft baseline stake, walk 470 ft at a bearing of 18°M. The 0 ft stake has browse tag #485 attached.





Map Name: Emery West

Diagrammatic Sketch

Township 21S , Range 5E , Section 27

GPS: NAD 27, UTM 12S 4312157 N, 470096 E

DISCUSSION

Wildcat Knolls - Trend Study No. 16C-35

This Wildcat Knolls study site was established in 1994. It samples a Mountain big and black sagebrush/grass community which is considered important for elk. The site has a general south aspect with a gentle slope of 3-5% at an elevation of 8,700 feet. There is little escape or thermal cover on the site. About half mile away there is good cover provided by Ponderosa pine trees. This area is part of the Emery allotment which is grazed from June 16 to September 30 by 1,387 cows on a 5 pasture rest rotation system. Water is limited here with guzzlers fairly close, about three-qaurters of a mile from the site. Pellet group data from 1999 estimate 9 deer, 109 elk and 29 cow days use/acre (22 ddu/ha, 269 edu/ha, 72 cdu/ha). Pellet group data from 2004 estimate 6 deer, 97 elk, and 30 cow days use/acre (15 ddu/ha, 240 edu/ha, and 73 cdu/ha). Nearly all of the elk and deer pellet groups for both sampled years were from the previous winter, although a few were more recent. Most of the cattle pats appear to be from last season.

Soil depth varies on the site with deeper soils along the shallow ravine corridors where mountain big sagebrush, snowberry, woods rose, and large serviceberry shrubs grow. In between these wetter areas, the soil is more shallow and drier. Black sagebrush and rabbitbrush dominate here. Effective rooting depth averages just over 11 inches along the study site baseline. It has a sandy clay loam texture with a slightly acid pH (6.4). Parent material is limestone. There is little rock and pavement on the surface or in the profile, yet there is a hard compacted layer at about 8 to 12 inches in depth. There is some slight to moderate pedestaling of soil around the base of plants and there is a small gully on the site. However, protective ground cover appears adequate to control most erosion.

There are several varieties of palatable browse on the site including serviceberry, black sagebrush, mountain big sagebrush, antelope bitterbrush, and snowberry. Serviceberry occurs on areas with wetter and deeper soils. Individual serviceberry plants are large, highlined, and mostly unavailable. Mountain big sagebrush dominates the drainage corridors while black sagebrush, dwarf rabbitbrush, and low rabbitbrush dominate the drier areas. It appears that there was a problem identifying dwarf rabbitbrush (*Chrysothamnus depressus*) and low rabbitbrush (*Chrysothamnus viscidiflorus*). Data from 1999 classified most of the rabbitbrush as low rabbitbrush.

Mountain big sagebrush displays light to moderate hedging, good vigor, and low decadency rates. Density of mountain big sagebrush has decreased from 4,500 plants/acre in 1994 and 1999, and down to 2,140 in 2004. The difference between 1999 and 2004 was the number of young plants and the number of decadent plants that died. The density of mature plants has continually decreased since 1994 from 4,060 plants/acre to 2,500 in 1999, and 1,540 in 2004. Drought conditions most likely prevented young plants from becoming established and further increased the rate of death for decadent plants.

Black sagebrush displays light hedging, good vigor, and low decadency rates. Black sagebrush increased from 4,740 plants/acre in 1994 to 8,020 in 1999, and to 3,460 in 2004. The high spike in 1999 was a result of substantial numbers of young plants in the population. The number of young plants decreased from 2,420 plants/acre in 1999 to only 40 in 2004. Density of decadent black sagebrush was 1,360 plants/acre in 1999 and decreased to 280 by 2004. Many of those decadent plants in 1999 died. The number of dead plants increased from 260 plants/acre in 1999 to 1,840 in 2004.

Herbaceous vegetation is diverse and abundant making up 50% of the vegetation cover on the site. Grasses provided 11% cover in 1994, 16% in 1999, and 13% in 2004. The dominant species are mutton bluegrass, letterman needlegrass, and Salina wildrye which provided 34% of the grass cover in 2004. Forbs are diverse yet only a few species are common. The most abundant was an annual goosefoot (*Chenopodium spp.*) that has not been present the past two readings. It provided 65% of the forb cover in 2004.

1994 APPARENT TREND ASSESSMENT

Protective ground cover combined with the gentle terrain prevents serious erosion on the site. Browse species are diverse and abundant. The preferred species appear to have stable populations with low decadency rates and light to moderate utilization. The browse trend appears to be stable with the only negative aspect the abundance of less desirable dwarf rabbitbrush. The herbaceous understory is abundant and diverse. However, the grasses are dominated by the less preferred letterman needlegrass and Salina wildrye. Several more desirable species exist in small numbers including bluebunch wheatgrass, slender wheatgrass, *Carex spp*, Indian ricegrass, and bottlebrush squirreltail. Several desirable forbs are found on the site. The Desirable Components Index (see methods) rated this site as poor to fair with a score of 50 due to good shrub cover, no young shrubs, and moderate grass and forb cover.

winter range condition (DC Index) - 50 (poor to fair) Mountain big sagebrush type

1999 TREND ASSESSMENT

Trend for soil is considered up slightly. The combination of the ratio of cover to bare soil and decrease in bare soil is enough to warrant a slightly upward change in soil trend. Litter cover has remained similar. The increase in vegetation cover comes primarily from an increase in shrub cover. Trend for browse is up for black sagebrush and stable for mountain big sagebrush. Black sagebrush density has nearly doubled due to a dramatic increase in young plants from 40 to 2,420 plants/acre. Use is heavier, although vigor is good and percent decadence has remained low. Mountain big sagebrush has a stable density with light to moderate use. Vigor remains good and decadency relatively low. The only other common shrub is low rabbitbrush (*Chrysothamnus viscidiflorus*) which was called dwarf rabbitbrush in 1994 (*Chrysothamnus depressus*). Combined density of these shrubs has increased slightly from 12,420 to 13,520 plants/acre. The population is mostly mature and not utilized. Overall, the browse trend is considered up slightly. Trend for the herbaceous understory is down slightly. Cover for grasses and forbs has increased but sum on nested frequency has declined enough to show a slightly downward trend. Nested frequency of Salina wildrye, Carex, mutton bluegrass and letterman needlegrass have declined significantly. The Desirable Components Index (see methods) rated this site as excellent with a score of 84 due to an increase in shrub cover, many young shrubs, and excellent grass and forb cover.

TREND ASSESSMENT
soil - up slightlyen (4)
browse - up slightly (4)
herbaceous understory - down slightly (2)
winter range condition (DC Index) - 84 (excellent) Mountain big sagebrush type

2004 TREND ASSESSMENT

Trend for soil is down slightly. Percent bare ground increased since 1999, while litter cover decreased. Vegetation remained fairly stable and provides adequate cover of soil, sum of nested for herbaceous cover has declined. Trend for key browse species, black and mountain big sagebrush, is down. The percentage of dead plants for black sagebrush population has increase from 3% in 1999 to 35% in 2004. Mountain big sagebrush has also increased the percentage of dead plants from 8% in 1999 to 29% in 2004. Utilization has decreased for both species and appears to only have light to moderate use. The decrease in the sagebrush populations is the extended drought. The other common specie, low rabbitbrush (*Chrysothamnus viscidiflorus*), has declined in density from 13,400 plants/acre in 1999 to 7,000 in 2004, but still maintains a high density. Trend for herbaceous understory is down slightly. Sum of nested frequency has declined for both perennial grasses and perennial forbs. The sum of frequency for annual forbs greatly increased, but this is an uncommon event and does not have long-term effects on trend. It was mostly because of one species, goosefoot (*Chenopodium*

spp.). It contributed 25% of the herbaceous understory. The Desirable Components Index (see methods) rated this site as fair with a score of 61 due to a decrease in shrub cover, few young shrubs, and good grass and forb cover.

TREND ASSESSMENT
soil - down slightly (2)
browse - down (1)
herbaceous understory - down slightly (2)
winter range condition (DC Index) - 61 (fair) Mountain big sagebrush type

HERBACEOUS TRENDS --
Management unit 16C, Study no: 35

Type	Species	Nested Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
G	Agropyron smithii	a42	a36	b74	.13	.34	1.91
G	Agropyron spicatum	a3	a4	b26	.03	.03	.32
G	Carex spp.	99	105	91	.21	.67	.94
G	Elymus salina	b253	a144	a116	4.10	5.76	4.52
G	Oryzopsis hymenoides	ab20	a11	b23	.25	.04	.19
G	Poa fendleriana	b177	c231	a111	1.85	5.41	2.23
G	Sitanion hystrix	11	3	12	.02	.04	.16
G	Stipa comata	a-	b23	a8	-	.56	.36
G	Stipa lettermani	b225	a145	a111	4.43	3.38	2.62
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		830	702	572	11.04	16.26	13.28
Total for Grasses		830	702	572	11.04	16.26	13.28
F	Agoseris glauca	-	8	2	-	.09	.00
F	Antennaria rosea	4	11	-	.06	.36	-
F	Astragalus convallarius	b17	a8	a-	.12	.01	.25
F	Astragalus miser	b35	b38	a9	.57	.93	.19
F	Astragalus spp.	5	9	9	.16	.66	.51
F	Castilleja linariaefolia	b38	b24	a1	.10	.14	.00
F	Calochortus nuttallii	a2	a6	b29	.00	.01	.09
F	Chaenactis douglasii	3	-	4	.00	-	.00
F	Chenopodium spp. (a)	a-	a-	b267	-	-	5.41
F	Cirsium spp.	1	-	-	.00	-	-
F	Crepis acuminata	c40	a-	b17	.14	-	.21
F	Eriogonum alatum	-	3	-	-	.03	-
F	Erigeron eatonii	b44	a16	a8	.12	.09	.04
F	Eriogonum racemosum	44	38	32	.14	.41	.47
F	Eriogonum umbellatum	38	23	28	.40	.51	.26

Type	Species	Nested Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
F	Gayophytum ramosissimum(a)	-	-	5	-	-	.01
F	Lappula occidentalis (a)	$_{a}$-	$_{a}$-	$_{b}$16	-	-	.20
F	Linum lewisii	-	6	4	-	.04	.01
F	Lomatium spp.	-	1	-	-	.00	-
F	Lupinus argenteus	1	10	-	.01	.25	-
F	Lygodesmia spp.	-	1	6	-	.03	.06
F	Machaeranthera canescens	6	9	3	.03	.04	.01
F	Machaeranthera grindelioides	-	1	-	-	.03	-
F	Mertensia spp.	8	-	-	.09	-	-
F	Penstemon carnosus	1	1	-	.03	.01	-
F	Penstemon spp.	-	8	5	-	.19	.31
F	Polygonum douglasii (a)	$_{a}$-	$_{a}$-	$_{b}$59	-	-	.12
F	Senecio multilobatus	-	2	2	-	.03	.00
F	Taraxacum officinale	-	3	3	-	.01	.00
F	Townsendia spp.	-	-	3	-	-	.00
F	Zigadenus paniculatus	$_{a}$4	$_{a}$-	$_{b}$17	.00	.00	.06
Total for Annual Forbs		0	0	347	0	0	5.74
Total for Perennial Forbs		291	226	182	2.00	3.91	2.53
Total for Forbs		291	226	529	2.00	3.91	8.27

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 16C, Study no: 35

Type	Species	Strip Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
B	Amelanchier utahensis	1	2	2	1.76	2.29	2.96
B	Artemisia frigida	1	1	1	-	-	-
B	Artemisia nova	58	67	56	3.20	6.18	2.37
B	Artemisia tridentata vaseyana	56	55	42	4.34	6.98	2.93
B	Chrysothamnus depressus	80	5	1	2.73	-	-
B	Chrysothamnus nauseosus hololeucus	2	0	4	-	-	.03
B	Chrysothamnus viscidiflorus viscidiflorus	13	88	82	.41	3.90	7.35
B	Eriogonum corymbosum	4	5	5	.03	-	.06
B	Opuntia spp.	3	0	1	.18	.00	.01
B	Purshia tridentata	1	0	2	.63	.38	.15
B	Rosa woodsii	0	2	1	.00	.06	.03
B	Symphoricarpos oreophilus	6	1	1	.60	.15	.03
B	Tetradymia canescens	4	4	3	.03	-	.03
Total for Browse		229	230	201	13.94	19.96	15.98

CANOPY COVER, LINE INTERCEPT --
Management unit 16C, Study no: 35

Species	Percent Cover	
	'99	'04
Amelanchier utahensis	3.20	2.79
Artemisia nova	-	4.00
Artemisia tridentata vaseyana	-	4.28
Chrysothamnus viscidiflorus viscidiflorus	-	9.05
Eriogonum corymbosum	-	.18
Tetradymia canescens	-	.13

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 16C, Study no: 35

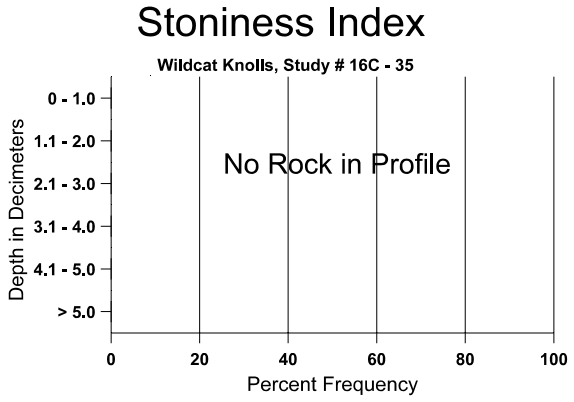
Species	Average leader growth (in) '04
Amelanchier utahensis	3.0
Artemisia tridentata vaseyana	2.2
Purshia tridentata	4.3

BASIC COVER --
Management unit 16C, Study no: 35

Cover Type	Average Cover % '94	'99	'04
Vegetation	33.81	43.76	37.09
Rock	.26	.04	.03
Pavement	.12	.13	.80
Litter	47.01	45.68	34.76
Cryptogams	.00	0	0
Bare Ground	30.31	24.97	44.07

SOIL ANALYSIS DATA --
Management unit 16C, Study no: 35, Study Name: Wildcat Knolls

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
11.4	52.7 (14.8)	6.4	60.0	15.4	24.6	2.7	10.9	182.4	0.5



PELLET GROUP DATA --
Management unit 16C, Study no: 35

Type	Quadrat Frequency		
	'94	'99	'04
Rabbit	10	4	5
Elk	65	51	51
Deer	24	5	2
Cattle	7	3	6

Days use per acre (ha)	
'99	'04
-	-
109 (269)	97 (240)
9 (22)	6 (15)
29 (72)	30 (73)

BROWSE CHARACTERISTICS --
Management unit 16C, Study no: 35

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
94	**20**	-	-	20	-	-	100	0	-	-	0	74/88
99	**40**	60	-	40	-	-	0	50	-	-	0	93/115
04	**40**	-	-	40	-	-	50	0	-	-	0	62/67
Artemisia frigida												
94	**80**	-	-	80	-	-	0	0	-	-	0	-/-
99	**40**	-	-	40	-	-	0	0	-	-	0	-/-
04	**40**	-	-	40	-	-	0	0	-	-	0	-/-
Artemisia nova												
94	**4740**	680	40	4060	640	340	58	0	14	6	6	10/16
99	**8020**	100	2420	4240	1360	260	53	23	17	1	1	8/15
04	**3460**	280	120	3060	280	1840	5	.57	8	5	5	7/11
Artemisia tridentata vaseyana												
94	**4520**	-	60	4060	400	580	77	0	9	1	1	34/36
99	**4560**	400	1500	2500	560	380	46	2	12	4	4	19/29
04	**2140**	220	400	1540	200	880	7	7	9	5	5	21/26
Chrysothamnus depressus												
94	**11160**	60	-	10980	180	20	0	0	2	-	0	3/7
99	**120**	-	20	100	-	-	0	0	0	-	0	4/7
04	**20**	-	-	20	-	-	0	0	0	-	0	-/-
Chrysothamnus nauseosus hololeucus												
94	**60**	-	-	60	-	-	0	0	0	-	0	18/18
99	**0**	-	-	-	-	-	0	0	0	-	0	-/-
04	**120**	-	-	100	20	-	33	0	17	17	17	18/19

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus viscidiflorus viscidiflorus												
94	**1260**	-	-	1240	20	-	0	0	2	-	0	7/8
99	**13400**	180	1820	11340	240	40	15	0	2	-	0	5/9
04	**7000**	240	840	6060	100	400	0	0	1	.28	.28	7/11
Eriogonum corymbosum												
94	**100**	-	-	100	-	20	0	0	0	-	0	11/16
99	**160**	-	60	80	20	-	13	0	13	-	0	14/18
04	**140**	-	-	140	-	-	86	0	0	-	0	10/14
Opuntia spp.												
94	**100**	-	20	80	-	-	0	0	-	-	0	3/10
99	**0**	20	-	-	-	-	0	0	-	-	0	-/-
04	**60**	-	-	60	-	-	0	0	-	-	0	2/4
Purshia tridentata												
94	**20**	-	-	-	20	-	100	0	100	-	0	23/26
99	**0**	-	-	-	-	-	0	0	0	-	0	26/69
04	**40**	-	-	40	-	-	0	0	0	-	0	25/55
Rosa woodsii												
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**120**	40	120	-	-	-	0	0	-	-	0	-/-
04	**60**	-	60	-	-	-	0	0	-	-	0	-/-
Symphoricarpos oreophilus												
94	**300**	-	-	300	-	-	27	0	-	-	0	13/23
99	**20**	-	-	20	-	-	0	0	-	-	0	20/39
04	**20**	-	-	20	-	-	0	0	-	-	0	16/29
Tetradymia canescens												
94	**140**	-	20	120	-	-	0	0	-	-	0	7/9
99	**120**	-	80	40	-	-	0	33	-	-	0	6/7
04	**100**	-	-	100	-	-	0	0	-	-	0	7/11